

CLAIMS

1. An implantable left ventricular assist device using a cylindrical cam which is implanted to a heart-diseased patient to assist the heart, the implantable left ventricular assist device comprising:

an actuator for generating a linearly reciprocating driving force;

a pusher plate which performs a linearly reciprocating motion by the actuator;

a blood sac which is contracted and expanded due to compression by reciprocating the pusher plate and the restoration of a sac itself; and

a chamber for accommodating the blood sac, the pusher plate and the actuator, combining the same physically, and protecting the same within the body of a patient.

2. The implantable left ventricular assist device using a cylindrical cam of claim 1, wherein said actuator comprises:

a motor for generating a torque;

a major axis which is driven by the motor, including a major axis gear at its end;

a planetary gear assembly which is threadedly engaged with the major axis gear and reduces the rotational speed;

a minor axis, including a vessel-shaped fixing portion built in the center of the planetary gear assembly, and a cylindrical portion within which a pair of rollers are mounted on a predetermined position, while having a large cylindrical shape with respect to the fixing portion;

a cylindrical cam which is inserted into the cylindrical portion of the minor axis, combined with the pusher plate, provided with a double cam groove along which the rollers move on the outer circumferential surface, and performs a linearly reciprocating motion according to the rotation of the minor axis; and

a case and a rear cover which is provided with a ring gear threadedly engaged with the planetary gear assembly externally in a corresponding position, enables the motor and the minor axis to rotate together, and accommodates the cylindrical cam, the minor axis, the planetary gear assembly, the major axis and the motor.

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3. The implantable left ventricular assist device using a cylindrical cam of claim 2, wherein said planetary gear assembly comprises three planetary gears which are threadedly engaged with the major axis gear to rotate, and a support plate in which the planetary gears are rotatably fixed and of which the minor axis is fixed in the center.

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4. The implantable left ventricular assist device using a cylindrical cam of claim 2, wherein said cam grooves are in an X-crossed form while forming a substantially sine waveform in the axial direction according to the circumference of the cam outer circumferential surface and have a symmetrical structure with each other.

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5. The implantable left ventricular assist device using a cylindrical cam of claim 1, wherein said actuator further comprises a guiding axle which is substantially vertically fixed to the center of the rear cover, and

20 a guiding piece externally disposed on the guiding axle and fixed to the cylindrical cam, for guiding a linearly reciprocating motion of the cylindrical cam.

6. The implantable left ventricular assist device using a cylindrical cam of claim 2, wherein said actuator further comprises a guiding axle which is substantially vertically fixed to the center of the rear cover, and

25 a guiding piece externally disposed on the guiding axle and fixed to the cylindrical cam, for guiding a linearly reciprocating motion of the cylindrical cam.

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7. The implantable left ventricular assist device using a cylindrical cam of claim 5,  
wherein a plurality of guiding protrudes are provided with along the axial line on the outer  
circumferential surface of the guiding axle, and guiding grooves are formed so that the  
guiding protrudes are inserted in the opposite positions of the guiding piece corresponding to  
5 the guiding protrudes.

8. The implantable left ventricular assist device using a cylindrical cam of claim 6,  
wherein a plurality of guiding protrudes are provided with along the axial line on the outer  
circumferential surface of the guiding axle, and guiding grooves are formed so that the  
guiding protrudes are inserted in the opposite positions of the guiding piece corresponding to  
10 the guiding protrudes.